REMARKS

Claims 1, 6, and 8-16 are pending in the present application. Claims 1, 8, 9, 10, 11 and 12 are in independent form. Claim 1 is amended. Claims 2-5, 7 and 17-20 have been cancelled. In view of the above amendments and the following remarks, favorable reconsideration and allowance of the present application is respectfully requested.

Applicants appreciate the Examiner's acknowledgement that the references cited in the Information Disclosure Statements filed on September 23, 2005, April 24, 2007 and September 24, 2009 have been considered.

I. FOREIGN PRIORITY & DRAWINGS

Applicants note that the Examiner has not indicated (i) whether the drawings filed on September 23, 2005 are accepted, or objected, to by the Examiner, or (ii) acknowledged receipt of all certified copies pertaining to foreign priority claimed under 35 U.S.C. §119.

As there is no discussion in the *Detailed Action* indicating that the drawings are objected to, Applicants will assume that the drawings are acceptable unless indicated otherwise in the next Patent Office communication.

Also, Applicants note that the Patent Office's Patent Application Information Retrieval (PAIR) system indicates that a certified copy of the priority document was received by the Patent Office on September 23, 2005.

Thus, Applicants request that the Examiner acknowledge receipt of all of the necessary certified copies in the next Patent Office communication.

II. CLAIM AMENDMENTS

By the present Amendment, independent claim 1 is amended. The amendments to claim 1 are supported, at least, by original claims 2-4 and paragraphs [0060] and [0061] of the published Specification, U.S. Publication No. 2007/0037370 A1.

Thus, Applicants submit that the amendments do not introduce new matter.

III. CITED ART REJECTION

(A) Claims 1-7 and 17-20 stand rejected under 35 U.S.C. §102(b) as allegedly being anticipated by Lee et al., Japanese Patent Publication No. 2001-234341 (hereinafter "JP '341").[1] *Applicants respectfully traverse the rejection.*

i. INDEPENDENT CLAIM 1

Amended independent claim 1 is directed to a high-efficiency synthesis method of a carbon nanostructure wherein (*inter alia*) "initiation of the contact between the raw material gas and the catalyst is carried out instantaneously by...

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[1] Applicants note that the Examiner refers to JP '341 as belonging to "Jin et al." However, the JP '341 belongs to Cheol-jin LEE and Jae-eun YOO, the same inventors as U.S. Patent No. 6,350,488 B1.

(a) instantaneously initiating, under electronic control or computer control, feed of the raw material gas to the catalyst that is stationary in a reaction chamber;

(b) under a condition where the raw material gas is built up, causing the catalyst to instantaneously move from outside the raw material gas to inside the raw material gas;

(c) under a condition where the raw material gas is built up, instantaneously spraying powders of the catalyst to the raw material gas so that the catalyst is instantaneously moved from outside the raw material gas to inside the raw material gas; or

(d) under a condition where the catalyst is placed in the raw material gas that is built up, subjecting the catalyst to beam irradiation, infrared beam irradiation, electron beam radiation, or ion beam irradiation so that a temperature of the catalyst or a temperature in a vicinity of the catalyst is instantaneously increased to a reaction temperature."

Applicants submit that JP '341 fails to explicitly teach, or otherwise suggest, the above features recited in amended independent claim 1.

First, the rejection states that "...the catalyst is stationary relative to the substrate in paragraph 0007." Action, p. 3.

However, independent claim 1 recites that "...the catalyst that is stationary in a reaction chamber." This limitation of claim 1 is directed to the position of the catalyst relative to the reaction chamber, not a substrate.

Furthermore, JP '341, directed to a method of synthesizing carbon nanotubes using a thermal chemical vapor deposition apparatus, teaches that the substrate 100 including the catalyst moves within the reaction chamber. Thus, the catalyst taught by JP '341 is not "stationary in the reaction chamber" as recited in independent claim 1.

Thus, JP '341 also fails to teach, or suggest, "initiation of the contact between the raw material gas and the catalyst is carried out instantaneously by...instantaneously initiating, under electronic control or computer control, feed of the raw material gas to the catalyst that is stationary in a reaction chamber" as recited in amended independent claim 1.

Secondly, JP '341 is directed to a method for supplying and exhausting a reactant gas. That is, the reactant gas (*i.e.*, the raw material gas) is circulated and exhausted out of the reaction chamber via fan 800. See paragraph [0015] of JP '341. Thus, the reactant gas is not "built up" (as recited in claim 1) in the reaction chamber.

Thirdly, JP '341 fails to teach, or suggest, (i) causing the catalyst to instantaneously move from outside the reactant gas (that is built up) to inside the reactant gas, or (ii) instantaneously spraying powders of the catalyst to the reactant gas so that the catalyst is instantaneously moved from outside the reactant gas (that is built up) to inside the reactant gas.

JP '341 also fails to teach, or suggest, under a condition where the catalyst is placed in the reactant gas that is built up, subjecting the catalyst to beam irradiation, infrared beam irradiation, electron beam radiation or ion beam irradiation so that a temperature of the catalyst or a temperature in a vicinity of the catalyst is instantaneously increased to a reaction temperature.

For at least these reasons, Applicants submit that JP '341 fails to explicitly teach, or otherwise suggest, all of the features recited in amended independent claim 1.

Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the rejection to independent claim 1, and claim 6 at least by virtue of its dependency on independent claim 1. (Claims 2-5, 7 and 17-20 are cancelled.)

(B) Claims 8 and 9 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over JP '341 in view of Lee et al., U.S. Patent No. 6,350,488 B1 (hereinafter "the '488 Patent"). Applicants respectfully traverse the rejection.

i. INDEPENDENT CLAIM 8

Independent claim 8 is directed to a high-efficiency synthesis method of a carbon nanostructure wherein (*inter alia*) "a total flow quantity of the carrier gas and the raw material gas is controlled to be constant all the time in such a manner that in instantaneously initiating feed of the raw material gas of a predetermined flow quantity, a flow quantity of the carrier gas is instantaneously decreased proportionately." Applicants submit that JP '341 and the '488 Patent fail to explicitly teach, or otherwise suggest, the above features recited in independent claim 8.

First, the rejection states that "...Jin et al. teaches using a carrier gas (paragraph 0019), but does not explicitly teach the specifics of reducing or

increasing the raw material gas and reducing or increasing the carrier gas proportionately. Lee et al. teaches reducing the raw material gas and increasing the carrier gas accordingly in Figure 7, column 6 lines 24-33. In this section Lee reduces the raw material gas and replaces it with carrier gas in order to accurately control the length of the carbon nanotubes and stopping undesireable carbon reactions." Action, p. 4-5.

However, the '488 Patent states that "[t]he carbon source gas is supplied at a flow rate of 20 to 200 sccm for 10 to 60 minutes." '488 Patent, col. 5, ll. 4-6. The '488 Patent further states that "[i]t is preferable that before the purification (step 60), an inert gas is supplied into the reaction furnace 300, as illustrated in FIG. 7, at a rate of 200 to 500 sccm to exhaust the remaining carbon source gas from the reaction furnace 300 through a gas outlet 340 (step 50 of FIG. 1)." '488 Patent, col. 6, ll. 24-28.

Thus, the carbon source gas is supplied at a flow rate of 20 to 200 sccm, followed by the carrier gas, which is supplied at a flow rate of 200 to 500 sccm. Thus, a total flow quantity of the carrier gas and the raw material gas is not "controlled to be constant all the time" as recited in independent claim 8.

Secondly, the '488 Patent teaches that, after the synthesis of the carbon nanotubes is completed, the carbon nanotubes 10 can be subjected to in-situ purification (step 60). "In particular, the second valve 420 of FIG. 3 is closed to cut off the supply of the carbon source gas and a fourth valve 460 is opened to supply a purification gas from a purification gas supply

source 470 to the reaction furnace 300 through the gas inlet 320." '488 Patent, col. 5, l. 65 – col. 6, l. 2.

Nothing in the '488 Patent suggests that "in instantaneously initiating feed of the raw material gas of a predetermined flow quantity, a flow quantity of the carrier gas is instantaneously decreased proportionately" as recited in independent claim 8.

Thus, the '488 Patent fails to cure the deficiencies of JP '341 respect to independent claim 8.

For at least these reasons, Applicants submit that JP '341 in view of the '488 Patent fails to explicitly teach, or otherwise suggest, a high-efficiency synthesis method of a carbon nanostructure wherein "a total flow quantity of the carrier gas and the raw material gas is controlled to be constant all the time in such a manner that in instantaneously initiating feed of the raw material gas of a predetermined flow quantity, a flow quantity of the carrier gas is instantaneously decreased proportionately" as recited in independent claim 8.

Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the §103(a) rejection to independent claim 8.

ii. INDEPENDENT CLAIM 9

Independent claim 9 is directed to a high-efficiency synthesis method of a carbon nanostructure wherein (*inter alia*) "a total flow quantity of the carrier gas and the raw material gas is controlled to be constant all the time" and "when the feed flow quantity of the raw material gas is

instantaneously increased or decreased by some quantity, a feed flow quantity of the carrier gas is instantaneously decreased or increased proportionately." Thus, Applicants submit that independent claim 9 is patentable over the combination of JP '341 and the '488 Patent for similar reasons as given above with respect to independent claim 8.

Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the §103(a) rejection to independent claim 9.

IV. REQUEST FOR REJOINDER

In the event that independent claim 1 is allowed, Applicants respectfully request rejoinder of claims 13-16, which depend from and therefore require all of the features of independent claim 1.

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CONCLUSION

Accordingly, in view of the above, reconsideration of the rejections and allowance of each of claims 1, 6, 8, 9 and 13-16 in connection with the present application is earnestly solicited.

Should there be any matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned at the telephone number below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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